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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample is included. (AG)

ED 066465

TECHNICAL REPORT

ON

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

CONVEYOR-LOADER, PLASTIC TOY PARTS (toys and games) 9-13.01

B-583 S-303

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TM 001 949

U. S. Employment Service
in Cooperation with
Michigan State Employment Service

June 1964

GATB # 2493

STANDARDIZATION OF THE GENERAL APTITUDE TEST BATTERY

FOR

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Summary

The General Aptitude Test Battery was administered to a final sample of 48 workers employed as Conveyor-Loaders at Shwayder Bros. Inc. plants in Michigan and Ontario, Canada. The criterion consisted of supervisory ratings. On the basis of mean scores, standard deviations, correlation with the criterion, job analysis data and their combined selective efficiency, Aptitudes K-Motor Coordination and M-Manual Dexterity were selected for inclusion in the final test norms.

GATB Norms for Conveyor-Loader, Plastic Toy Parts 9-13.01, B-583 S-303

B-1001			B-1002		
Aptitude	Tests	Minimum Acceptable Aptitude Score	Aptitude	Tests	Minimum Acceptable Aptitude Score
T	CB-1-G CB-1-K	75	K	Part 8	80
M	CB-1-M CB-1-N	105	M	Part 9 Part 10	100

Effectiveness of Norms

The data in Table IV indicate that only 67 percent of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 78 percent would have been good workers. 33 percent of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 22 percent would have been poor workers.

TECHNICAL REPORT

I. Purpose

This study was conducted to determine the best combination of aptitudes and minimum scores to be used as norms on the General Aptitude Test Battery for the occupation of Conveyor-Loader, Plastic Toy Parts 9-13.01.

II. Sample

The GATB was administered during December 1963 to thirty-seven workers employed as Conveyor-Loaders at Shwayder Bros. Inc., Ecorse, Michigan. In an effort to enlarge the sample, 13 workers performing the same work at the Shwayder Bros. plant in Stratford, Ontario were administered the GATB in February 1964. Two were eliminated because they were not performing the duties described in the job analysis. The final sample consists of 48 workers, 31 female and 17 male, employed as Conveyor-Loaders by Shwayder Bros. Inc. The only requirements for employment stipulated by the company are the abilities to speak, read and write English. A minimum of one week of training is required for becoming proficient in performing the various job duties.

TABLE I

Means (M), Standard Deviations (σ), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education, and Experience

N = 48	M	σ	Range	r
Age (years)	32.8	9.8	17-51	.224
Education (years)	10.4	1.8	6-13	-.082
Experience (months)	10.5	9.4	1-36	.313*

*Significant at the .05 level

III. **Job Description**

Job Title: Conveyor-Loader, Plastic Toy Parts 9-13.01

Job Summary: Fills pans with specified number of plastic building toy parts. May be required to package plastic pieces according to prescribed design.

Work Performed: While standing in front of waist-high conveyor belt, uses both hands rapidly to select specified number of plastic pieces from numbered stock bins behind conveyor belt. Differentiates pieces according to color, shapes and sizes ranging from 1/2 to 2 inches. Drops pieces in pans on idled conveyor belt which is activated at set intervals by automatic timer. Retrieves dropped pieces and places them in pan as part of specified count. Picks out faulty pieces and places them on conveyor belt for rejection.

Picks up preassembled box from stock pile or roller conveyor and sets it on shelf located over belt conveyor in front of stock bins. Using both hands, picks pieces out of bins according to code number and assembles them into design in box following sequence instructions. Picks out faulty stock and drops it into rejection box. Places completed display box on conveyor belt.

IV. Experimental Battery

All the tests of the GATB were administered to the sample group. Form B-1002B was administered to 39 workers and Form B-1002A was administered to 9 workers.

V. Criterion

The criterion data collected consisted of two sets of independent ratings made by the first-line supervisor on USES Form SP-21, "Descriptive Rating Scale." A period of at least two weeks elapsed between the first and second ratings. The rating scale consisted of nine items covering different aspects of job performance, with five alternatives for each item. Weights of one through five, indicating the degree of job proficiency attained, were assigned to the alternatives. A reliability coefficient of .83 was obtained for the criterion. Therefore, the two sets of ratings were combined, resulting in a distribution of final criterion scores of 31-81 with a mean of 59.6 and a standard deviation of 11.0.

VI. Qualitative and Quantitative Analyses

A. Qualitative Analysis

On the basis of the job analysis data, the following aptitudes were rated "important" for success in this occupation:

Form Perception (P) - required in differentiating color and size of plastic pieces, in detecting faulty pieces, and in packaging pieces into prescribed design.

Motor Coordination (K) - required in picking up and dropping plastic pieces in pans, and in assembling pieces into prescribed design in boxes on automatic conveyor belt.

Manual Dexterity (M) - required in working rapidly with both hands in picking up pieces, and in handling boxes.

On the basis of the job analysis data, V-Verbal Aptitude was rated "irrelevant" for success in this occupation.

B. Quantitative Analysis:

TABLE II

Means (M), Standard Deviations (σ), and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N = 48

Aptitudes	M	σ	r
G-Intelligence	84.9	19.0	.026
V-Verbal Aptitude	87.3	16.1	-.002
N-Numerical Aptitude	82.8	21.5	-.070
S-Spatial Aptitude	88.9	19.3	-.087
P-Form Perception	86.9	24.7	.008
Q-Clerical Perception	90.4	16.9	-.250
K-Motor Coordination	95.0	18.5	.191
F-Finger Dexterity	94.6	21.7	.099
M-Manual Dexterity	109.5	19.6	.219

C. Selection of Test Norms:

TABLE III

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important					X		X		X
Irrelevant		X							
Relatively High Mean							X	X	X
Relatively Low Sigma									
Significant Correlation with Criterion									
Aptitudes to be Considered for Trial Norms							K		M

Trial norms consisting of various combinations of Aptitudes K and M with appropriate cutting scores were evaluated against the criterion by means of the Phi Coefficient technique. A comparison of the results showed that B-1002 norms consisting of K-80 and M-100 had the best selective efficiency.

VII. Validity of Norms

The validity of the norms was determined by computing a Phi Coefficient between the test norms and the criterion and applying the Chi Square test. The criterion was dichotomized by placing 33 percent of the sample in the low criterion group because this percent was considered to be the unsatisfactory or marginal workers.

Table IV shows the relationship between test norms consisting of Aptitudes K and M with critical scores of 80 and 100, respectively, and the dichotomized criterion for Conveyor-Loader, Plastic Toy Parts 9-13.01. Workers in the high criterion group have been designated as "good workers" and those in the low criterion group as "poor workers."

TABLE IV

Validity of Test Norms for
Conveyor-Loader, Plastic Toy Parts (toys and games) 9-13.01
(K-80, M-100)

N = 48	Non-Qualifying Test Scores	Qualifying Test Scores	Total
Good Workers	7	25	32
Poor Workers	9	7	16
Total	16	32	48

Phi Coefficient = .344
χ^2 = 5.680
P/2 < .01

The data in the above table indicate a significant relationship between the test norms and the criterion for the sample.

VIII. Conclusions

On the basis of the results of this study, Aptitudes K and M with minimum scores of 80 and 100, respectively, have been established as B-1002 norms for Conveyor-Loader, Plastic Toy Parts 9-13.01. The equivalent B-1001 norms consist of T-75 and M-105.

IX. Determination of Occupational Aptitude Pattern

The data for this study did not meet the requirements for incorporating the occupation studied into the January 1962 edition of Section II of the Guide to the Use of the General Aptitude Test Battery. The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.